

BIG League

Chew

Rule 110

elementary cellular

with interesting behavior

live on the boundary between stability

and chaos.

Conway Game of Life

Also like Life, Rule 110 is **known**.

This implies

that, in principle,

using this automaton.

0s and 1s evolve according

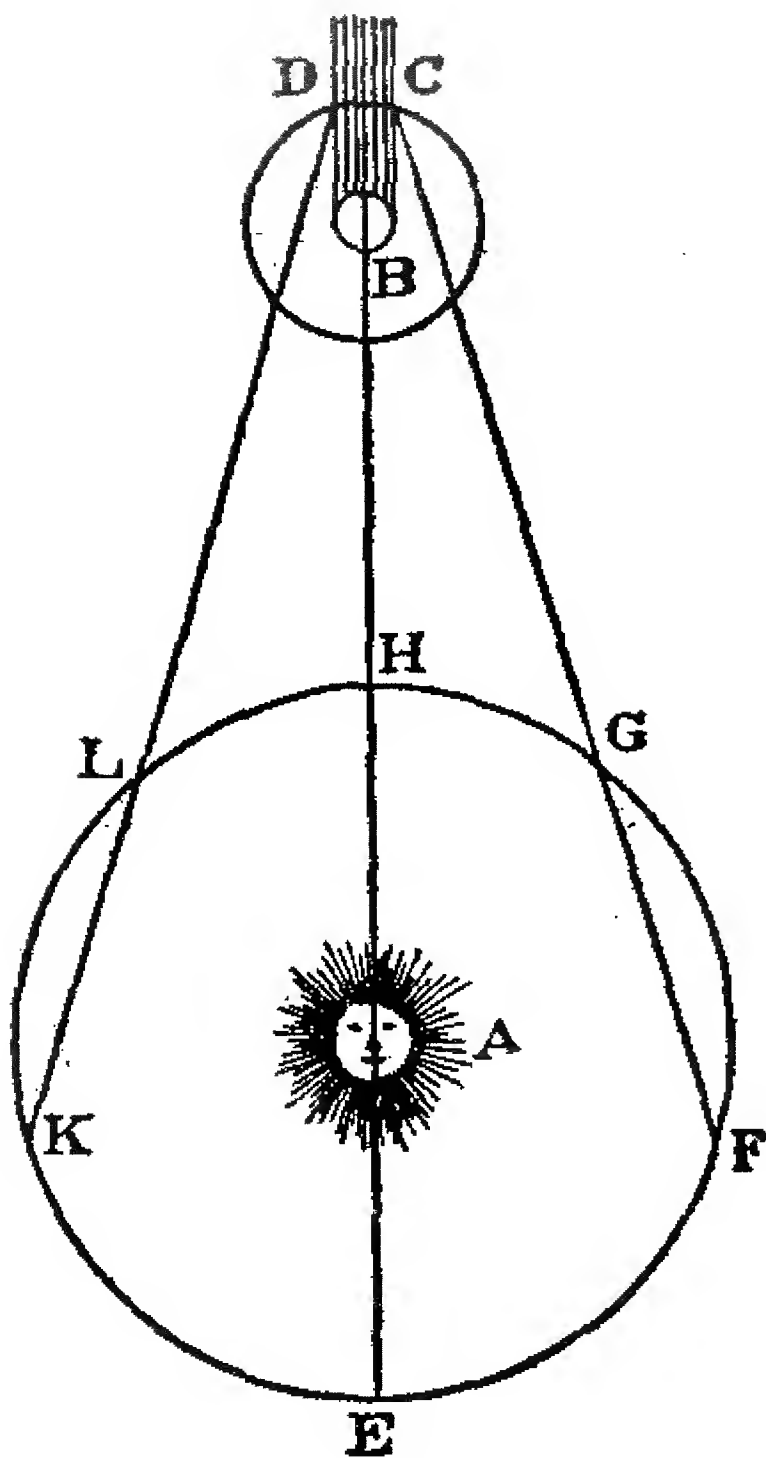
two neighbors.

binary History:

(X,Φ,⊗,X,Φ) ΦE XA

| | | | | | | | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 1 | 1 | 1 | 1 | 0 | 1 | 0 | 1 | 0 | 0 | 1 | 0 | 0 | 0 | 1 | 0 | 0 | 0 |
| 0 | | 1 | | 1 | | 0 | | 1 | | 1 | | 1 | | 1 | | 0 | |

Around 2000, Matthew Cook published a proof that Rule 110 is Turing complete, i.e., capable of universal computation, which Stephen Wolfram had conjectured in 1985. Cook presented his proof at the Santa Fe Institute conference CA98 before the publishing of Wolfram's book, A New Kind of Science. This resulted in a legal affair based on a non-disclosure agreement with a private company Wolfram Research. **Wolfram** Research blocked publication of Cook's proof for 2 years because Cook was an employee of Wolfram that was hired to do research for Wolfram's project and Cook was in breach of this non-disclosure agreement and in conflict with the binding responsibility for which he was hired for.



very slowly.

kinda like

tally sticks

Interesting properties

only one

proven,

complete.

although

"Class 4 behavior",

which is neither completely stable nor
completely chaotic. Localized structures appear and
interact in various complicated-looking ways.

Matthew Cook proved Rule 110 capable of supporting universal computation. Rule 110 is a simple enough system

to suggest that naturally occurring physical systems

may also be capable of

undecidable

Turing overheard

The original polynomial overheard.

obtained a court order

excluding Cook's paper from the published conference proceedings.

nevertheless became known.

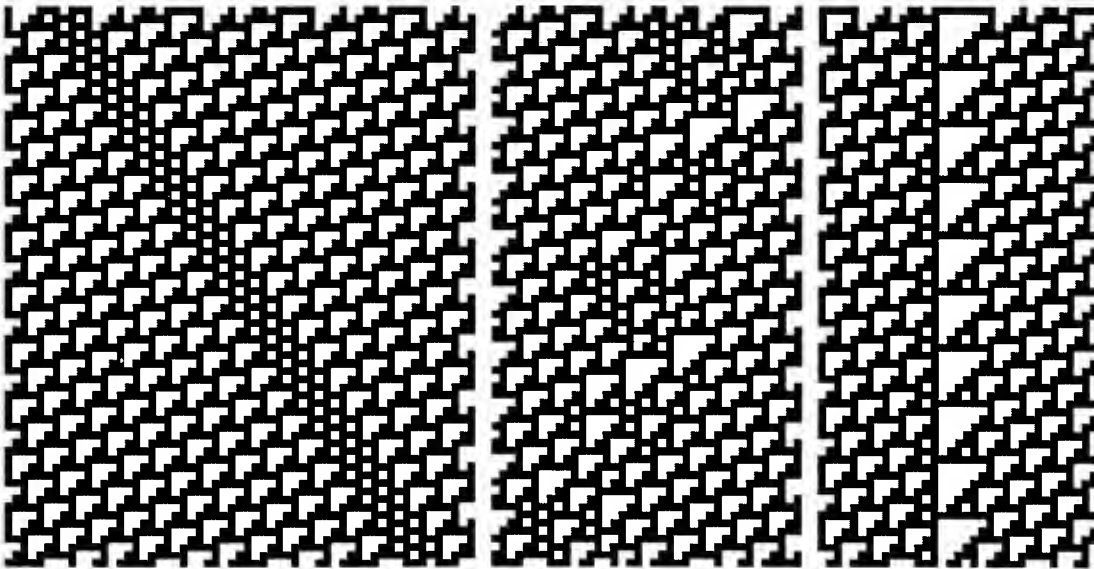
[citation needed]

character of Cook.

✓ you heard it 55 marks

infinitely repeating pattern in a Rule 110 universe.

Exploited.



are
ns in :
matter
its of
ade,

infinitely repeating background

universal machine.

Repeating background

every three generations.

The sequence **0001110111**

time elapses

from top to bottom: the top line following the next time.

time elapses

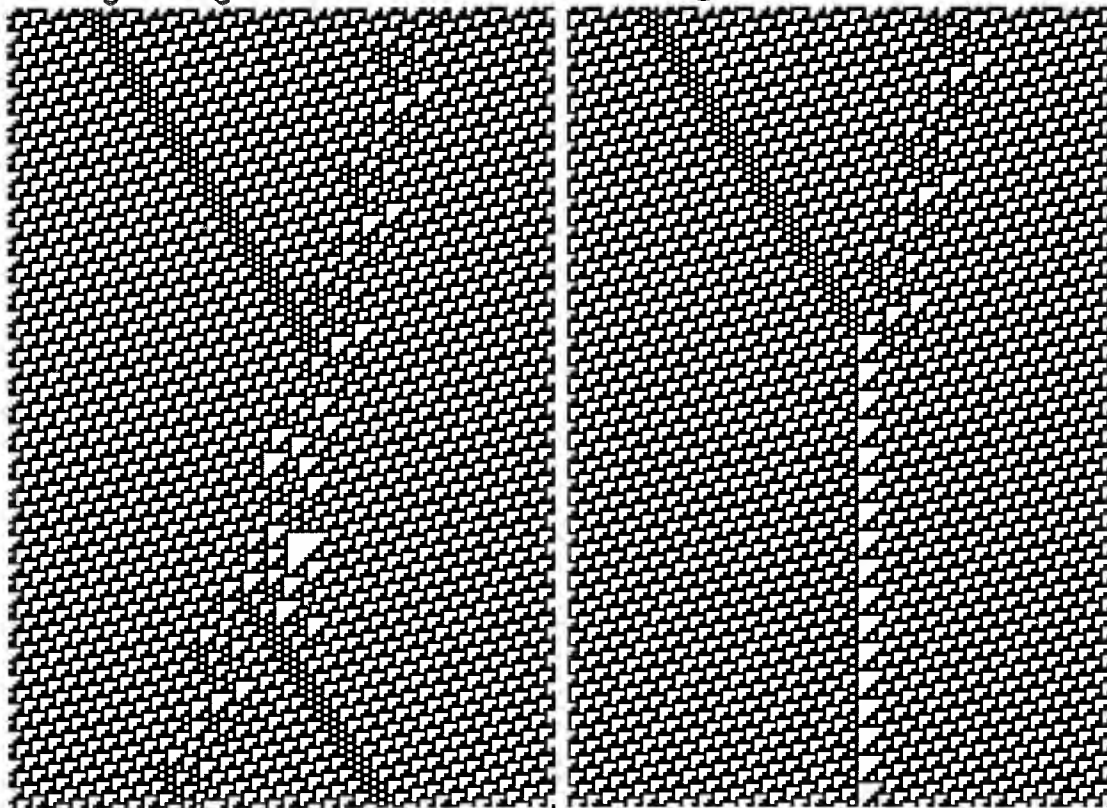
from top to bottom: **the top line following the next time.**

Every thirty generations. It comprises the sequence.

It comprises the sequence.

Five different evolutions of sequence.

Passing through each other without interacting



data string stationary;

infinitely repeating series production which start on the right and move to the left;

an infinitely repeating series of clock. Pulses which start on the left and move right.

utmost importance.

To get her wheels spinning

-fresh, salt, cooked and uncooked; the eggs of hens, geese, and of all the other birds I have mentioned. in great abundance and cakes made of eggs. finally everything that can be found thr
av
sha.

Every ki
thus the be
have not obs
people observin
break measures tha.

quark - gluon plasma (QGP) quark soup state of the matter high
temperature colliding
protons with lead

This great city contai.
edifices, which are sit
religious persons of
houses containing th
woman permitted t
food, more at sor

nuclei high
energy inside ss in
ids of
behaves what behaves

Among these t
architectural c
lofty wall, tl
enclosure th

we behave ded by a
of the
like a fluid

deceived in e.
things; and that they must learn there was but one God, the universal Lord of all, who had
created the heavens and earth, and us; that He was
and immortal **HE MUSIC** believe Him, and no other

2 A L . 2 -hythp

The viscosity of a fluid is a measure of its resistance to gradual deformation by shear stress or tensile stress.^[1] For liquids, it corresponds to the informal concept of "thickness". For example, **honey** has a much higher viscosity than water.^[2]

Viscosity is a property arising from collisions between neighboring particles in a fluid that are moving at different velocities.

Damping is an influence within or upon an oscillatory system that has the effect of reducing, restricting or **preventing** its **oscillations**. In physical systems, damping is produced by processes that dissipate the energy stored in the oscillation. Examples include **viscous drag** in mechanical systems, resistance in electronic oscillators, and absorption and scattering of light in optical oscillators. Damping not based on energy loss can be important in other oscillating systems such as those that occur in biological systems.

The damping of a system can be described as being one of the following:

Overdamped

The system returns (**exponentially decays**) to equilibrium without oscillating.

Critically damped

The system returns to equilibrium **as quickly as possible** without oscillating.

Underdamped

The system oscillates (at reduced frequency compared to the undamped case) with the amplitude **gradually decreasing** to zero.

Undamped

The system oscillates at its natural resonant frequency (ω_0).

On guitar, damping (also referred to as **choking**) is a technique where, shortly after playing the strings, the sound is reduced by pressing the right hand palm against the strings, right hand damping (including **Palm muting**), or relaxing the left hand fingers' **pressure on the strings**.

The **worst-case** complexity of an algorithm should be contrasted with its average-case complexity, which is an average measure of the amount **of resources** the algorithm uses on a random **input**?

(placeholders)

gestures

movement of body

shows idea

feeling

CARRIAGE, BEARING

means

by way of formality

or courtesy

tokens

Further evidence

suggests

gesture language linked. In humans, manually gesturing effects speaking, thus creating

natural associations of sound and physical efforts. Chimpanzees

Chimpanzees

Chimpanzees

Chimpanzees

move their mouths when performing fine motor tasks. Mechanisms play

evolutionary role. Enables intentional preexisting manual actions.

64

Disambiguate an intended meaning but also inspire confidence in the signal's reliability.

The suggestion. Once community-wide contractual understandings
had come into force^[69]

trust in communicative intentions be automatically assumed,
trust in communicative intentions be automatically assumed,
trust in communicative intentions be automatically assumed,
trust in communicative intentions be automatically assumed,

at last allowing Homo sapiens to shift to a more efficient default format.
Vocal distinctive
contrasts

are ideal for this purpose, only at point — persuasive body-language no longer required

—shift from manual gesture

to reliance.

19

21

70

the body, articulated with hands, body, facial, body

rather than inside the body

articulated with tongue, teeth, lips, and breathing.

citation needed

1. calls of our ancestors.
2. derived.

AI GORE

complexity of an algorithm is commonly expressed using **big O** notation, which excludes coefficients and lower order terms. When expressed this way, the time complexity is said to be described asymptotically, i.e., as the input size goes to infinity. For example, if the time required by an algorithm on all inputs of size n is at most $5n^3 + 3n$ for any n (bigger than some n_0), the asymptotic time complexity is $O(n^3)$.

Time complexity is commonly estimated by counting the number of elementary operations performed by the algorithm, where an elementary operation takes a fixed amount of time to perform. Thus the amount of time taken and the number of elementary operations performed by the algorithm differ by at most a constant factor.

Since an algorithm's performance time may vary with different inputs of the same size, one commonly uses the worst-case time complexity of an algorithm, denoted as $T(n)$, which is defined as the maximum amount of time taken on any input of size n . Less common, and usually specified explicitly, is the measure of average-case complexity. Time complexities are classified by the nature of the function $T(n)$. For instance, an algorithm with $T(n) = O(n)$ is called a linear time algorithm, and an algorithm with $T(n) = O(M^n)$ and $m^n = O(T(n))$ for some $M \geq m > 1$ is said to be an exponential time algorithm.

unit of measurement ~~a definite magnitude of a physical quantity, defined and adopted by convention by law, that is used as a standard for measurement of the same physical quantity. Any other value of the physical quantity can be expressed as a simple multiple of the unit of measurement.~~

Unary counting happens when you pour many equal amounts of fluid into the same cup and observe the height is the sum of the integer number of cups poured in. **Unary is a linear sum.** Turning pages in a book counts the width of the left and right sides of that book in unary in units of page width. If you searched through a dictionary in unary order, you would read all the pages 1 at a time and days later find the word you want. In radix/positional order, you find it exponentially faster using Binary search algorithm. You grab a thick block of pages and flip them all at once instead of unary order reading through each of them. Without the more direct branching, you would be unable to read that dictionary or Library catalog at the speed of millions or more words per second (minus the words you don't care about) and find your word and definition at practical speed.

A **Tag** system, in computing theory, for example Rule 110 which is capable of general computing while astronomically slow, computes in unary as a Queue. These layers of slowness build up recursively and only in a theoretical limit reach the practical computing we enjoy today which skip over those unary abstractions using numbers that refer to other numbers.

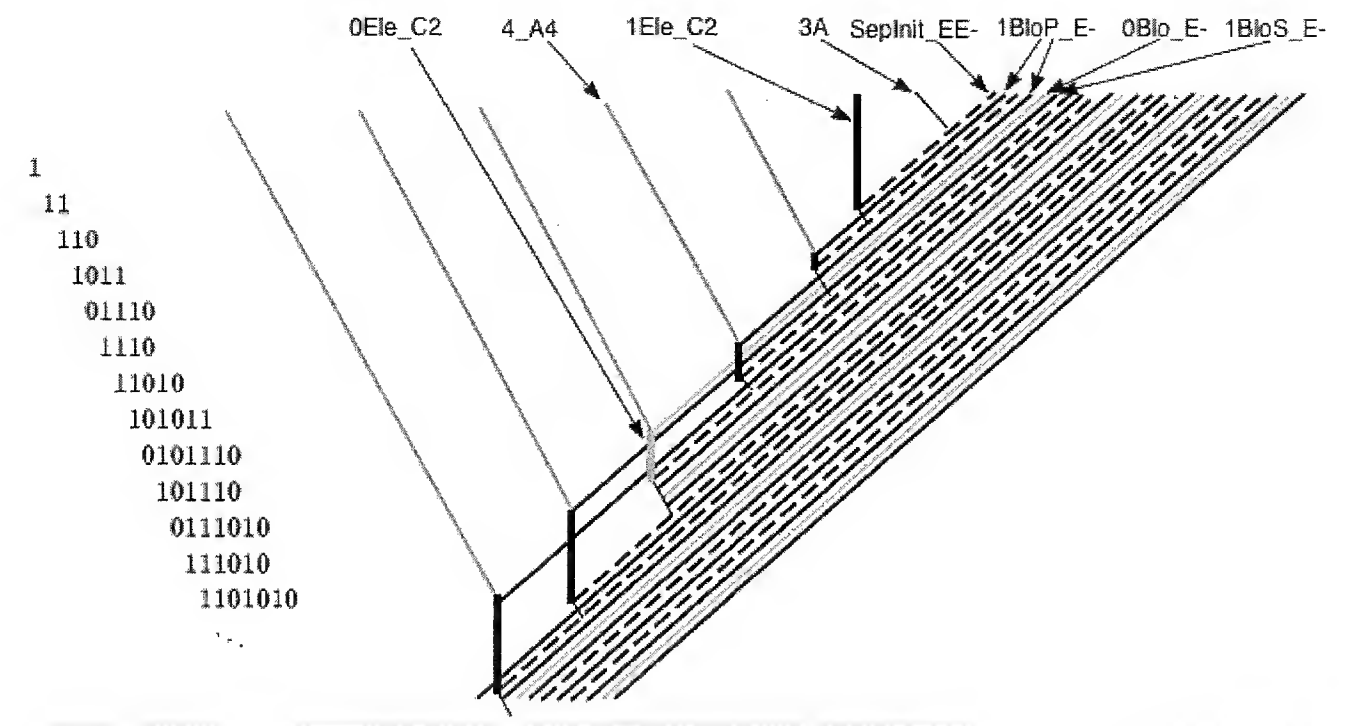


electrons may be degenerate.

Called the "granny's knot" with references going back to at least 1867, the knot was so-called because it is "the natural knot tied by women or landsmen". It has also been suggested that rather than impugning the knot-tying skill of grandmothers, the name "granny" may be a corruption of granary after its possible use tying the necks of grain sacks.

In addition to their uses outlined above, bots may also be implemented where a response speed faster than that of humans is required (e.g., gaming bots and auction-site robots) or less commonly in situations where the emulation of human activity is required, for example **chat bots**.

Cyclic tag system working



The reconstruction of a CTS in Rule 110 was using a regular language to Rule 110 over an evolution space of **56,240** cells to **57,400** generations. Writing the sequence 1110111 on the tape of cyclic tag system and a leader component at the end with two solutions^[sentence fragment].

See also

- Rule 30
- Rule 90
- Rule 184

We would not have sold blood to make money.

In computer science, the time complexity of an algorithm quantifies the amount of time taken by an algorithm to run as a function of the string representing the input^{[1]:226}. The time complexity of an algorithm is often expressed as a bend knot for attaching two ropes together.

To DISMAY A DATA SPIDER

Dear Theresa,

Because everyone loves a deal, and goods through the often.

This is injection locking.

Decision **tree learning** uses a decision tree as a predictive model which maps observations about an item to conclusions about the item's target value. It is one of the predictive modelling approaches used in statistics, data mining and machine learning. Tree models where the target variable can take a finite set of values are called classification trees. In these tree structures, leaves represent **class labels** and branches represent conjunctions of features that lead to those class labels. Decision trees where the target variable can take continuous values (typically real numbers) are called **regression** trees.

In decision **analysis**, a decision tree can be used to visually and explicitly represent decisions and decision making. In data mining, a decision tree describes data but not decisions; rather the resulting classification tree can be an input for decision making. **This page** deals with decision trees in data mining.

Disturbing others at nearby frequencies

- Tree
- Environment
- (other similar concepts)

2. (computing theory) A node, in a tree, that has no children.

leaf node)plural leaf nodes)

In mathematics and computer science, an algorithm is a self-contained step-by-step procedure, performed by a computer, for solving a problem or performing a set of operations to be automated reasoning.

Tree (No icon)
glyphicon glyphicon-tree-conifer
glyphicon glyphicon-tree-deciduous

A **pendulum** is a weight suspended from a pivot so that it can swing freely.^[1] When a pendulum is displaced sideways from its resting, equilibrium position, it is subject to a restoring force due to gravity that will accelerate it back toward the equilibrium position. When released, the restoring force combined with the pendulum's mass causes it to oscillate about the equilibrium position, swinging back and forth. The time for one complete cycle, a left swing and a right swing, is called the period. The period depends on the length of the pendulum, and also to a slight degree on the amplitude, the width of the pendulum's swing.

From its examination in around 1602 by Galileo Galilei, the regular motion of pendulums was used for timekeeping, and was the world's most accurate timekeeping technology **until the 1930s**.

Single tally

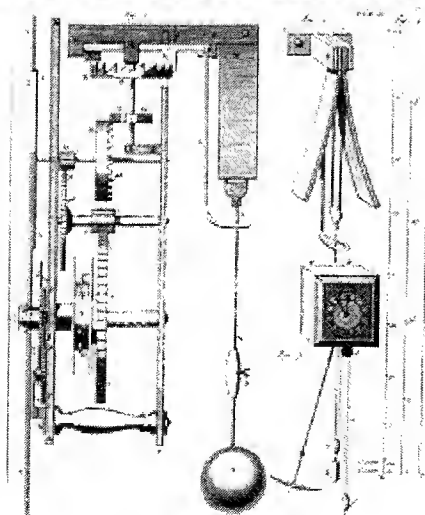
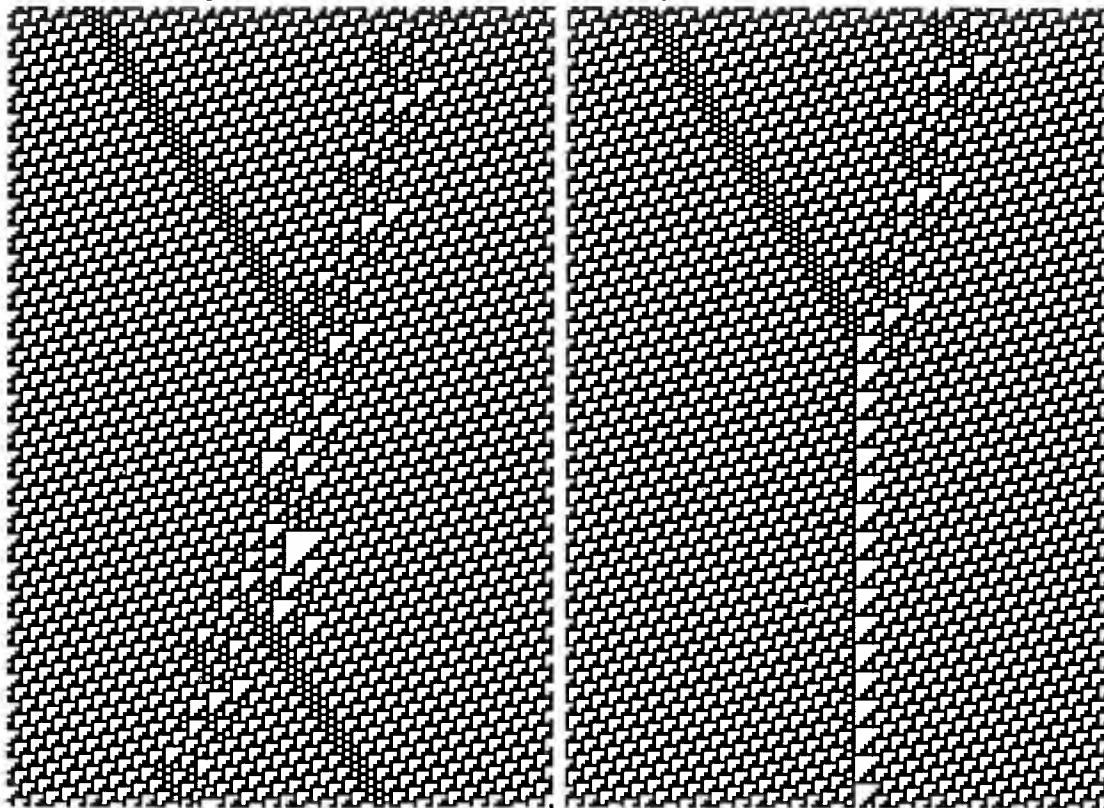
The single tally stick was an elongated piece of bone, ivory, wood, or stone which is marked with a system of notches (see: Tally marks). The single tally stick serves predominantly mnemonic purposes. Related to the single tally concept are messenger sticks (e.g., Inuit tribes), the knotted cords, khipus or quipus, as used by the Inca. Herodotus (c. 485 – 425 BC) reported the use of a knotted cord by Darius I of Persia (c. 521 – 486 BC).

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It comprises the sequence.

Five different evolutions of sequence.

Passing through each other without interacting



le 110

which start on the right and move to the left;

Pulses which start on the left and move right.

in a highly ordered way.

spacings

on the other hand,

A **pocket watch** (or **pocketwatch**) is a watch that is made to be carried in a pocket, as opposed to a wristwatch, which is strapped to the wrist.



require more
in binary, bi
y misleading
n is that a bi
m of the num
ace require
at the

An **algorithm** is an effective method that can be expressed within a finite amount of space and time^[1] and in a well-defined formal language^[2] for calculating a function.^[3] Starting from an initial state and initial input (perhaps empty),^[4] the instructions describe a computation that, when executed, proceeds through a finite^[5] number of well-defined successive states, eventually producing "output"^[6] and terminating at a final ending state. The transition from one state to the next is not necessarily deterministic; some algorithms, known as randomized algorithms, incorporate random input.^[7]